Plan Title:	**Geographic Support System**
Plan Number:	**CB-DC-94-01-E**
Plan ID:	**IT**

PART I - INFORMATION TECHNOLOGY ARCHITECTURE PLAN

1. Information Requirements

Accurate geographic information and lists of spatially located addresses are essential for the Census Bureau to provide accurate statistical data for:

- the apportionment of the seats in the Congress among the states,
- the state legislatures to redistrict their
  - Congressional representation, and
  - governmental and administrative subdivisions,
- equalization among participants in formula grant programs, and
- economic and demographic analyses by the private, Governmental, and academic sectors.

To that end, the Bureau of the Census (BOC) has entered agreements with several Federal agencies to share spatial data and to cooperate, under the umbrella of the Federal Geographic Data Committee (FDGC), to work with state, local, and tribal governments to help maintain the Nation's spatial data, especially the first stage called "Framework." With the passage of the Census Address List Improvement Act of 1994, Public Law 103-430, the BOC has entered into an agreement with the U.S. Postal Service to utilize their address and related information in exchange for our geographic and spatial information. We also have agreements with the Environmental Protection Agency, the Natural Research Conservation Service, the Army Corps of Engineers, the Federal Railway Administration, the Federal Highway Administration, and the Resources and Special Projects Administration of the Department of Transportation.

On an annual basis, the BOC conducts a Boundary and Annexation Survey for all functioning counties and selected county subdivisions and incorporated places. In the three years preceding a census, all functioning county subdivisions and incorporated places (a total of over 39,000 governmental entities) are included in the survey. The most current census map is sent to each area and the local government official provides corrections and updates to the legal limits of the entity.

In many instances, the respondent also provides updates to the map features and their attributes. The updated geographic and feature information is sent back to the BOC where it is maintained in a geographic data base. (See Geographic Support System below.) Throughout the decade,

other data users and state, local, and tribal government officials continue to provide updates and corrections to the feature network, reporting them to the BOC regional offices or headquarters.

The Census Bureau makes its data base available to all potential users through a series of extract products. Samples of these products are accessible through the World Wide Web. These products also are provided to Census Bureau partners who assist in keeping the address list and spatial data bases up-to-date.

GEOGRAPHIC SUPPORT SYSTEM

To support its various censuses and sample surveys, the Census Bureau has prepared an integrated and automated computer-based geographic support system (GSS). GSS is comprised of a cartographic/geographic data base, the Topologically Integrated Geographic Encoding and Referencing (TIGER) data base, a Master Address File (MAF), and related maintenance and file use software.

The TIGER data base provides a geographic framework from which the Census Bureau can generate the maps required to support its boundary collection and validation activities, its address list compilation and validation activities, its field data collection operations, and its data product dissemination program. This same geographic framework serves as the basis for assigning the housing units, farms, and business establishments in each census and sample survey to a specific geographic location. It provides a basis for automated questionnaire check-in and control systems to generate follow-up assignments or reminder notices. Finally, it is a source file from which the Census Bureau can generate geographic table stubs and summary cartographic products for data tabulation and customer support purposes.

For the 1990 decennial census, the Census Bureau developed the Address Control File (ACF), to compile, update, and manipulate the addresses of individual housing units. The ACF used the geographic structure of the TIGER data base as its framework to ensure that decennial census statistical data tabulations would align perfectly with the geographic products that accompanied those data tabulations.

To support the future statistical programs of the Nation, the Census Bureau is building and keeping up-to-date the Master Address File (MAF) which originated with information from the 1990 ACF, the U.S. Postal Service Delivery Sequence File (DSF), and local files provided to the Census Bureau in accordance with Public Law 103-430, the Census Address List Improvement Act of 1994. When linked to the TIGER data base, the combination is referred to as the linked MAF/TIGER data base. The Census Bureau will use MAF/TIGER to support its future censuses and sample surveys.

CONTRIBUTIONS of the GSS to COMMERCIAL GIS

A GIS consists of one or more geographic data bases, geographically-referenced statistical data and/or physical data, mathematical analysis, and high-resolution computer graphics. Color-coded images and icons allow a user to spot trends and relationships not clearly evident in the numerical data. With a digital geographic/data base, a user can build a personal framework for spatial analysis and modeling, add different kinds of data, and devise visually intelligible solutions to problems.

The GSS, especially the public extract products from the Census TIGER® data base, has had a major positive effect on new GIS applications in both the private and public sectors. The application of GIS technologies is one of the fastest growing areas of computing. The growth of spatial analysis tools and the use of these tools in both the private and public sectors to visualize spatial data has grown geometrically in recent years.

What makes the TIGER data base particularly valuable in a GIS environment is that it contains:

- all geographic features of the Nation essential in conducting censuses and surveys, such as roads, streets, waterways, railroads, and governmental unit boundaries, along with their associated names and codes,

- the coordinate values defining intersection points along each feature, as well as other geometric characteristics of the feature such as the curve vectors defining the shape of those features that are not straight,

- all address ranges between intersection points for those records representing streets and roads in areas with city-style addresses along with the ZIP+4 Code associated with each address range,

- the geographic area codes applicable to each segment of the feature, based on the geometric relationship of the boundaries in the file to the features which those boundaries surround.

The TIGER/Line® files, a public extract of the TIGER data base, provides spatial data, with a wealth of attribute information, that is otherwise not available in the public sector. The TIGER/Line® files and other TIGER extract products contain digital descriptions of geographic areas, including Governmental and statistical area boundaries and codes, latitude/longitude coordinates, feature names and types, and address ranges.

The private sector has developed software packages and provides specialized services to meet the needs on the part of the customers for the TIGER extract products. Over 140 firms have notified the Census Bureau that they use various TIGER extract products to provide services for applications such as, but not limited to, the following: address matching, geocoding, mapping, redistricting services, vehicle routing and dispatching, desktop mapping, land survey, site location, marketing analysis and studies, and transportation management.

Because all TIGER extract products include Federal Information Processing Standards (FIPS) codes, the entities can be matched easily to demographic data from the 1990 Decennial Census as well as data from the 1992 Agriculture and Economic Censuses.

NOTABLE END-USERS OF TIGER EXTRACT PRODUCTS

Data user applications of the TIGER extract products range from devising more efficient car pooling, snow-clearing, meter-reading, and garbage-collecting routes, to the New York City Metropolitan Transportation Authority's 32-county project to improve scheduling and increase ridership on its buses and trains. The Newport News, Virginia Waterworks is using TIGER extract products and its own water line data base to create a GIS that includes its 250 square mile territory. The Baltimore County, Maryland Police Department used TIGER extract products to geocode spousal abuse cases and link them with variables such as income, employment, etc. The Maryland Department of State Planning uses TIGER extract products to produce customized files for each of Maryland's 23 counties and the city of Baltimore. Local planners use these files to determine where services are needed for the elderly, child care facilities, recreation sites, schools, and libraries.

OTHER GIS PRODUCTS

Besides traditional paper maps, the Census Bureau makes machine readable extracts of the TIGER data base available to the public. The TIGER/Line® files, the TIGER/Census Tract Street Index™ files, the TIGER/Geographic Identification Code Scheme (GICS)™, and the TIGER/Census Tract Comparability™ files already are available. Planned products include the TIGER/Spatial Data Transfer Standard (SDTS)™ files formatted according to the standards established by the National Institute of Standards and Technology (NIST) as Federal Information Processing Standard (FIPS) 173.

TYPE AND VOLUME OF TRANSACTIONS

Pursuant to P. L. 103-430, many of the 39,000 units of government will provide one or more address lists to the Census Bureau each year. During the first year of the program, we estimate that the Census Bureau will receive 4,000 address lists, and that each address list will take an analyst, working interactively at a graphic workstation, one week to edit and link the individual addresses on the list to the correct location in the TIGER data base.

This interactive editing/linking requires the retrieval of information from the TIGER data base and the use of address and map reference material mounted on associated digitizing tables. Based on two shifts per day, each workstation can handle approximately 100 address lists per work-year. Using the same basis for calculations, we project a need to process 8,000 address lists the following year and 12,000 address lists in 1997.

During the next four years, we anticipate the following activity on major projects:

a. Enter block boundaries from 70,000 map sheets at 4 hours/sheet for Phase 1 (the Block Boundary Suggestion Project (BBSP)) of the 2000 Redistricting Data Program.

   Produce 240,000 sheets of paper maps to support the first two phases of the 2000 Redistricting Data Program.

b. Produce 170,000 sheets of paper maps for the annual Boundary and Annexation Survey.

c. Enter feature and attribute updates from 300,000 map sheets at 1 hour/sheet for the TIGER Improvement Program in support of the linkage of the MAF to the TIGER data base.

   Produce 140,000 sheets of paper maps in support of the Census Map Preview Program.

d. Develop and complete a comprehensive MAF in compliance with the articles of PL 103-430 at a minimum of 24,000 address lists to be carried to the TIGER data base.

e. Match approximately 30 million addresses each three months from USPS carrier routes in which there is at least one address change.

f. Addresses from administrative records will be "geocoded", or assigned census geographic codes, in order to make the highest use of such files.

g. Produce 500 sheets of paper maps per month for special censuses, fulfillment of commercial orders, for the Public Information Office, the Congressional Affairs Office, and other Federal agencies and BOC divisions.

Additional projects will be initiated in 1998 and 1999. These projects have not yet been sufficiently defined for inclusion here.

2. Planned Processing and Telecommunications Architecture

A. GSS Decentralization

Components of the GSS exist at headquarters, in the regional offices, and at the DPD.

(1) Headquarters--located in Suitland, Maryland. The headquarter's components of the GSS are the Geography Division, the Geographic Support Branch of the Field Division, the Computer Services Division, and the Telecommunications Office.

The Geography Division is a 195 member professional and clerical support staff that manages all aspects of the GSS. Staff size peaked at about 240 in late 1989.
The Geographic Support Branch, Field Division (GSB/FLD), has 16 professional and two clerical support staff who coordinate the geographic programs conducted at the

regional offices and related field geographic processing sites. The GSB/FLD prepares detailed procedures from specifications provided by the Geography Division.

The Computer Services Division (CSvD) provides centralized data processing support for the geographic program.

The Telecommunications Office manages the WAN that allows all components of the GSS to communicate with each other at all sites.

(2) Regional Offices (ROs)--The Census Bureau has 12 ROs located in major metropolitan centers. To support the GSS, the 12 ROs collect information from state, local, and tribal Governments needed to update and correct the geographic information in the TIGER data base and the address information in the MAF.

(3) Data Preparation Division (DPD)--The DPD, located in Jeffersonville, Indiana, has a 30-member professional and clerical support staff that works primarily on the GSS. Here, the TIGER data base and the MAF are updated and corrected.

DPD also produces paper copies of the maps for various statistical programs, and fulfills commercial orders for copies of census maps. Paper maps are produced on electrostatic plotters in the DPD, from plot files received on magnetic tape, through the network or on CD-ROM. All commercial map orders are filled on a fully reimbursable basis.

B. GSS Functions

The Geographic Support System has four functional components. These include the geographic update system (GUS), the field map plotting system, the publication map plotting system, and the Census address list (MAF).

(1) Geographic Update System (GUS)

The GUS can reference a portion (such as a single county) of the TIGER data base and the MAF at a time, for updates, and corrections to these data bases, or for research purposes. GUS is used in various areas of the Census Bureau for count review, problem resolution, and data analysis.

(2) Field Map Plotting System

To produce paper maps of any area, a plot file of the area is prepared at the Charlotte Computer Center. Plot files are transmitted to distributed map plotters at three

Regional Offices, and at the Data Preparation Division (DPD) in Jeffersonville, Indiana.

(3) Publication Map Plotting System

The Census Bureau does basic interactive map editing and map image manipulation in vector format using its graphic workstations as the host for the map files. The publication map plotting system utilizes the information in the TIGER data base to create a publication map image. Both commercial and custom software that runs on the graphic workstations are utilized in this process.

To reduce its need for capital-intensive equipment to meet limited peak production requirements, the Census Bureau established a memorandum of understanding with the United States Geological Survey (USGS) for raster plotter use, film development, and use of map proofing equipment.

(4) Master Address File

The Master Address File, or Census address list, is linked to the spatial TIGER data base. Extensive batch processing occurs to spatially locate (geocode) each address in the MAF and link it to the TIGER data base.

C. GSS CONFIGURATION

The master TIGER data base and the MAF reside on two DEC 8400 Alpha systems at the Charlotte Computer Center (CCC), where they are accessible to all users in Regional Offices (RO), DPD and headquarters. The TIGER data base is divided into 3,287 county partitions files, with some counties further subdivided into multiple partitions for improved processing efficiency.

TIGER data base and MAF update and correction operations take place in all ROs on graphic workstations connected via the Census Bureau's WAN to the main file server/processing environment in the CCC. Telecommunication lines between the regional geographic processing sites, the Data Processing Division, (DPD) in Jeffersonville, Indiana, and the related headquarters offices in Suitland, Maryland carry file transfers and control/status information between these facilities.

Corrections and additions to the TIGER data base are made by clerks using annotated paper copies of census maps generated from the TIGER data base, or by computer-assisted transfer of new feature information from locally-provided spatial files.

The field map plotting system plots maps remotely in selected ROs, currently Denver, Charlotte, and Atlanta. Map plot files will be produced on graphic workstations connected

with the plotters at one of the decentralized geographic sites. Or, file production will be done at the CCC. In this case, the plot files are transmitted to the actual map plotting site.

In 1995, the Geography Division replaced 101 aging and obsolete graphic workstations bought in 1987. These are used to:

- add new features to the TIGER data base,
- capture the latitude and longitude coordinates for added features,
- capture governmental unit, statistical entity, and administrative area boundaries and codes, and
- correct existing feature information by changing or deleting the placement, coordinates, names, codes, and so forth, of features in the TIGER data base.

An additional 120 machines with 700-1,000 GB of associated disk storage space will be needed over the course of the next two years to keep the Master Address File current and to process monthly changes in the U.S. Postal Service Delivery Sequence File.

Future expansion of our interactive MAF/TIGER maintenance operations may be required. We are hopeful that many of these additional operator "seats" can be provided by relatively inexpensive X-terminals.

Peripheral tape storage devices and uninteruptable power supplies will be required on a site-by-site basis. All systems must operate in a normal office environment without need for special site preparation.

Existing dedicated data communications links will be used for data transmission between the Charlotte Computer Center and the Geography Division, the Data Preparation Division, and the ROs. The graphics workstations will be connected to upgraded local area networks at each site.

To comply with the requirements documented in the BOC's Graphics Workstation Standard and to meet the needs of the MAF/TIGER data base operations, any systems obtained must possess at least the following characteristics:

- CPU with SPECint92 greater than 150 and SPECfp92 greater than 120
- 32 MB physical RAM
- 1 GB system disk
- color 1280x1024 display resolution
- 10Base-T ethernet interface
- 20-inch multi-scan tilt-and-swivel monitor
- POSIX compliant operating system
- Network File System (NFS) software
- C programming language software

- 36-inch by 48-inch digitizing table or 11-inch by 17-inch digitizing tablet
- 2.5 GB external data storage disks (700 GB for 120 systems)
- Full hardware and software maintenance support

Color map plotters for "E" size paper will have functional characteristics that include a minimum of four colors (including black) for paper maps that have a clarity of at least 400 dots per inch where the registrations is within one dot from one color to the next color. The minimum communication input are Ethernet and RS-232. The devices must operate in a normal office environment and any chemicals or toners must be determined safe for use in that environment by the Environmental Protection Agency.

D. TIGER SOFTWARE DEVELOPMENT ENVIRONMENT

Software development for the DEC VAX/VMS installation in Charlotte and UNIX workstations in Regional Offices, the Data Preparation Division in Jeffersonville, Indiana, and in Suitland is done using primarily ANSI C. In past years all development work was done in FORTRAN, and much of this software is still in use and must be maintained on both platforms. C++, Tcl/Tk, and perl are also used. VAX RDB was used in past years for relational database applications. These applications are presently migrating to ORACLE.

The Geography Division successfully uses the following procedure for testing and releasing software.

Development staff

First tests its own software.

Installs any interactive software on test workstation, maintained by the Update Operations Branch as an exact copy of remote production TIGER workstations.

Production Operations Branch

Conducts testing for any large-scale batch software before release to production environment.

Update Operations Branch

Tests interactive applications before release to production environment.

Moves approved applications to the division's software archives maintained by the Production Operations Branch.

(A utility, rdist is used to install and upgrade UNIX based software.)

ALTERNATIVES TO PLANNED ARCHITECTURE

A. Enhancing Capabilities of the Existing Workstations

The first alternative investigated was to extend the life of the 101 existing systems. This is not cost-effective as these devices, procured in 1987, are four years past their useful lifetime, and are failing at an ever increasing rate. The manufacturer ceased production of graphics workstations in 1991, and will cease maintenance activities associated with its former product line at the end of this fiscal year. Replacement parts are no longer available.

B. Replacing the Workstations with Intel-Based Systems

The second alternative investigated was to replace the obsolete Tektronix graphics workstations with Intel-based systems running a UNIX-based operating system.

This alternative was not selected because:

(1) the speed of both the I/O bus and the graphics display subsystems on such microcomputers is insufficient for the Geography Division's processing needs,

(2) such systems do not meet the BOC's standard for graphics workstations.

C. Replacing Existing Plotters with Desktop Laser Printers

There are a few manufacturers of desktop laser printers that can produce color maps up to 11 inches in width and 17 inches in length. Although the size of these maps would be sufficient for individual census enumerators in urban areas, we would need to print far too many sheets to cover a large land area or sparsely populated area because assignment areas are based on a minimum workload and not a maximum land area. More significantly, there would be too many sheets for any local official to effectively work with in a medium to large population incorporated place or an incorporated place with a large land area.

This alternative cannot work for the BOC geographic programs that are scheduled through 1999. However it will be a viable option if we have to print census enumerator maps in district offices for the Year 2000 decennial census.

D. Enhancing the Capabilities of Existing Calcomp Plotters

In 1988 the Census Bureau acquired 42 black and white Calcomp Corporation plotters that were used in the Data Preparation Division and the RCC's for the 1990 decennial census operations that required maps. For the 1990 census, we plotted more than seven million

paper maps. After the RCCs were closed, these plotters were used in the ROs or shipped to DPD for storage.

These are black and white plotters and they cannot be retrofitted to plot in color. Because the Redistricting Data Program requires color maps, this alternative is not viable. However, for as long as these machines remain usable, we will use these plotters when black and white plotting is necessary and the color map plotters are committed to other production jobs.

It is also significant that manufacturer has abandoned the electrostatic plotting field entirely and so the models owned by the Bureau are supported by third party service organizations.

3. Security

The security needs of the GSS have been integrated with the general Census Bureau security processes.

Plan Title: Geographic Support System
Plan Number: CB-DC-94-01-E
Plan ID: IT

PART II - ANNUAL PLAN

1. Architecture Status

SYSTEM LIFE

The TIGER data base supports all demographic and economic current surveys, the 1997 Agriculture and Economic Censuses, various research and development projects, the decennial census pretests and Dress Rehearsal, and various Census 2000 operations. The MAF is essential to all census operations for which housing unit addresses as an essential element.

Over the time frame from 1997 through 2002, the linked MAF/TIGER data bases will support cooperative Federal interagency projects and voluntary surveys which in-turn update:

- the boundaries of all governmental, administrative, and statistical areas recorded in the geographical component of the TIGER data base, and

- all streets, roads, and other relevant map features needed to describe these geographic units:

    - for field operations,
    - for reporting the results of data collection activities, and
    - for building and maintaining the inventory of all housing unit addresses in the Nation.

Any decision to replace systems after then will be based on the needs of critical BOC programs, an assessment of current technology, cost, reliability experience, and the status of vendor support.

SUPPORT SERVICE CONTRACTS

Maintenance agreements will be obtained for any hardware or software acquired for use during the useful life of the architecture described in Part I. The use of temporary support service contracts may also be needed for any systems development/maintenance associated with a conversion to open systems, for administrative support related to planned federal systems procurements, or for automated and computer assisted efforts to update the linked MAF/TIGER data bases, as well as with other projects.

The Geography Division currently has 105 employees whose primary activities are application software development. This number will not grow materially in FY 1997. Because of restrictions on hiring permanent civil service employees we are actively pursuing contracting as a means of satisfying any additional needs for software development. We are in the process of bringing the first three contract programmers on board now and will expand this number as funding permits.

2. IT Objectives

The Census Bureau also needs to continually explore new technologies in digital cartography and geographic information systems (GIS) to stay abreast of changes in customer expectations and of any technological developments pertinent to the maintenance of the MAF/TIGER data bases.

The Census Bureau is now enhancing the data handling capacity of its data communication network to accommodate the increased traffic that will result from its greatly expanded office automation activities, its significant new automated data analysis activities, its improved geographic processing activities, and its MAF activities.

In that the linked MAF/TIGER data bases reside on a central computer system, and the primary building and updating activities for both the address list and spatial data take place in 14 decentralized locations, the GSS has a crucial need for the significantly upgraded wide area network (WAN). These building and updating activities require the transfer of massive quantities of spatial data sets.

The Census Bureau has a cooperative project with the U.S. Postal Service (USPS) to supply regular updates to the USPS Delivery Sequence File (DSF). It will continue its cooperative program with the USGS, and will establish cooperative programs with other Federal agencies, plus state, local, and tribal Governments to accomplish the required geographic and address updates on a continuous basis.

3. Status

A. Accomplishments/Progress

Having successfully fulfilled the geographic support needs of the 1990 Decennial Census and the 1992 Agriculture and Economic Censuses, the greatest immediate needs include:

- Implementation of Public Law 103-430, the Census Address List Improvement Act of 1994, which directs the Census Bureau to utilize local address lists to help build and maintain the MAF.

- Implementation of the agreement with the USPS, under P.L. 103-430, for their assistance in building and maintaining the MAF.

- Extending the capabilities of the TIGER data base to fulfill the unfolding needs of the:

    - Development of the MAF,
    - Census Address List Review,
    - Use of administrative records,
    - Census 2000 statistical area program,
    - Census 2000 Redistricting Data Program,
    - Economic and Agriculture Censuses, the
    - Redesign of current surveys, and
    - Other customers, within or outside of government.

Early steps taken over the past year to fulfill these needs include:

- Production of vast majority of paper maps needed for the Tiger Improvement Program. These will be used to enter geographic feature and attribute updates to the TIGER/MAF data base.

- Completion of the acquisition, testing, and acceptance of 141 graphic workstations, 20 electrostatic plotters, and 3 DEC Alpha machines.

- Acquisition of telecommunications hardware to enhance data communication network.

B. Current Plans

The Geography Division needs to acquire additional graphic workstations, large UNIX file servers, and additional map output devices including large format and small format plotters, beyond those procured in FY 1995. A variety of such plotters are needed, with electrostatic, inkjet, and laser technology. Some 52 plotters at about $75,000 each, will be needed during peak processing. This is funded by GSS; additional plotters to support Census 2000 will be funded by the decennial census. CD-R (Compact Disk - Recordable) devices are needed to transfer map files.

These graphic workstations will support the continuing development of standards-compliant software to manage and use the GSS, and to continue moving the GSS to an open systems environment. We estimate that we may purchase an additional 115 high performance graphic workstations to support the implementation of P.L. 103–430 and the associated linked MAF/TIGER data base activities.

The map output devices will be used to support the boundary collection and validation activities, to build and maintain the linked MAF/TIGER data bases, and to satisfy the objective of having state and local officials Nationwide preview the status of the feature network in the TIGER data base by providing them with maps that they can update and return to the Census Bureau.

Description	Price	FY 1997 Units	FY 1997 Total	FY 1998 Units	FY 1998 Total
Laser Printers 11X17	3,000	28	84,000	0	0
Electrostatic Plotters[1]	75,000	16	1,200,000	16	1,200,000
Workstations[2]	20,000	75	1,500,000	40	800,000
X-Terminals[3]	3,500	100	350,000	100	350,000
PC Microcomputers[4]	4,500	100	450,000	100	450,000
CD-R Devices	7,000	0	0	60	420,000
File Servers[5]	350,000	6	2,100,000	7	2,450,000
File Server	600,000	1	600,000	1	600,000
Total			6,284,000		6,270,000

Starting immediately, but continuing throughout the decade, the Geography Division also needs to acquire a small number of high performance graphic workstations each year for evaluation and testing purposes. This will allow the GSS to stay abreast of the rapidly changing technology and to assure that major acquisitions of high performance graphic workstations are truly open systems compliant and cost-effective. It also must continue seeking more effective means to meet the requirements of the FGDC and the new demands of the National Information Infrastructure.

After FY 1997, the Geography Division will again need to assess the need to upgrade or replace existing high performance graphic workstations, spatial data base and MAF file servers, disk storage, and map output devices to support the scale of geographic and address requirements of the 2000 decennial census.

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[1] Additional color electrostatic plotters needed to maintain the MAF/TIGER data bases through the expanded Boundary and Annexation Survey in 1997 and beyond, the 1997 Economic Censuses, and Census 2000, as well as other geographic programs.

[2] Additional workstations needed to replace outmoded equipment used for software development, and to process increased volume in TIGER updates.

[3] Will supplement workstations in the 12 Regional Offices and in the Data Preparation Division, used to update and maintain MAF/TIGER data bases.

[4] Pentium PCs to replace outdated and incompatible office automation equipment in Headquarters, purchased over 5 years ago. Meet Census Bureau standards for this purpose, and for use as an interface to MAF/TIGER data bases by subject matter staff. (Minimum P133 machines with 1.6 GB hard drives, 2MB fast video RAM, 17", 1024 X 768 color display, CD ROM drives, and associated software).

[5] Large UNIX multi processor servers for use in the Regional Offices, Data Preparation Division, and Headquarters for processing maps and other MAF/TIGER batch operations. Each server will have a large disk farm (150-200GB) and upward scalability. Each will have a minimum of 512 MB of memory. The first seven will be for the three current map plotting sites (Denver, Charlotte, and Atlanta), Headquarters, and three of the Regional offices with the most TIGER update work. In FY '98 the remaining Regional Offices and the DPD will receive similar equipment. Machines for Headquarters and DPD (or Bowie) will be large UNIX multi processor machines, with 300-400GB of storage, 1GB of memory, and 8 CPUs.

4. Implementation Schedule

All Regional Offices					
Map Type	Start	End	Weeks	Sheets/Set	Sets
PL94-171 Program					
BBSP	Feb-96	May-96	17	70,000	2
BBSP Verification	Oct-96	Sep-97	52	70,000	1
PL94-171 - Phase 2	Aug-97	Jun-98	48	70,000	2
PL94-171 - Phase 2 Verification	Jan-99	Nov-99	48	70,000	1
PL 94-171 County Block Maps	Nov-00	Dec-00	9	70,000	7
County Subdivision Outline Maps	Nov-00	Dec-00	9	110	7
Census Tract Boundary Maps	Nov-00	Dec-00	9	6,500	7
Voting District Boundary Maps	Nov-00	Dec-00	9	8,500	7
108th CD Delineation Maps	Jun-01	Jan-02	31	15,000	2
108th CD Certification Maps	Feb-02	Jun-02	17	15,000	2
105th CD Delineation Maps	Jan-96	Jun-96	22	2,000	2
105th CD Certification Maps	Jul-96	Aug-96	4	2,000	2
106th CD Delineation Maps	Jan-98	Jun-98	22	2,000	2
106th CD Certification Maps	Jul-98	Aug-98	4	2,000	2
Boundary and Annexation Maps					
1996 BAS	Feb-96	Apr-96	13	500	1
1997 BAS	Oct-96	Dec-96	13	75,000	1
1998 BAS	Aug-97	Dec-97	22	100,000	1
1999 BAS	Aug-98	Dec-98	22	100,000	1
2000 BAS	Aug-99	Dec-99	22	100,000	1
2001 BAS	Oct-00	Dec-00	13	60,000	1
Tribal Review Maps - 1998	Oct-97	Dec-97	13	2,000	2
Tribal Review Maps - 1999	Oct-98	Dec-98	13	2,000	2

All Regional Offices					
Map Type	Start	End	Weeks	Sheets/Set	Sets
Tribal Review Maps - 2000	Oct-99	Dec-99	13	2,000	2
Master Address File					
TIP Tract - w/add ranges (4K/mo)	Feb-96	Jun-02	334	334,000	1
PALS (2K/mo)	Jun-96	Jun-02	317	158,500	1
TIGER Data Base Update					
Census Map Preview-County	Apr-96	Jun-97	65	60,000	1
Census Map Preview-Places/MCDs	Apr-96	Jun-97	65	50,000	1
Census Map Preview-Am Indian	Apr-96	Jun-97	65	30,000	1
Statistical Areas Programs					
Census Tract Delineation	Oct-96	Jun-97	39	40,000	2
BNA Delineation	Oct-96	Jun-97	39	40,000	2
CDP Delineation	Oct-96	Jun-97	39	40,000	2
TDSA/TJSA Delineation	Oct-96	Jun-97	39	10,000	2
Census Tract Verification	Jan-98	Sep-99	91	40,000	1
BNA Verification	Jan-98	Sep-99	91	40,000	1
CDP Verification	Jan-98	Sep-99	91	40,000	1
TDSA/TJSA Verification	Jan-98	Sep-99	91	10,000	1
UDAP Delineation	Jun-01	Mar-02	43	20,000	2
UDAP Verification	Sep-01	Jun-02	43	20,000	1
TAZ Delineation	Jan-99	Mar-00	43	40,000	2
TAZ Verification	Apr-01	Dec-01	39	40,000	1
Field Maps					
Targeted MAF Validation	Dec-98	Mar-99	17	150,000	2
List/Enumerate - block Maps	Sep-99	Jan-00	17	500,000	2
Advance Listing - block maps	Feb-97	Aug-97	30	750,000	2

All Regional Offices					
Map Type	Start	End	Weeks	Sheets/Set	Sets
Enumerator Locator Map	Apr-98	Jan-00	96	250,000	3
County Locator	Nov-99	Jan-00	13	9,000	3
District Office Wall Maps - Urban & Rural	Nov-99	Jan-00	13	5,000	3
Postal Locator Maps	Nov-99	Jan-00	13	2,000	3
MAF Reconciliation - Tract/BNA	Mar-97	Sep-97	30	250,000	3
Cycle 1 ARA Block Split Maps	Apr-99	Sep-99	26	55,000	2
Cycle 2 ARA Block Split Maps	Apr-00	Jun-00	13	160,000	2
Late Receipt ARA Block Split Maps	Jul-00	Jul-00	4	8,000	2
Response Rate Maps - Local Off/Media (500/wk)	Apr-00	May-00	8	4,800	2
ICM Block Sketch Maps-Urban	Apr-00	Jun-00	13	20,000	2
ICM Block Sketch Maps-Update/Leave	Apr-00	Jun-00	13	5,000	2
ICM Block Sketch Maps-PR	Apr-00	Jun-00	13	2,500	2
POW/CD Work Maps	Jul-00	Sep-00	13	50,000	1
Local Government Info Products					
LUCA - Tract/BNA (250K)	May-98	Oct-98	26	250,000	1
LUCA - Places, MCDs, Am Indians (100K)	May-98	Oct-98	26	100,000	1
LUCA Verif- Tract/BNA (150K)	Mar-99	May-99	13	150,000	1
LUCA Verif- Places, MCDs, Am Indians (100K)	Mar-99	May-99	13	100,000	1
2000 Boundary Verif - Counties	May-00	Aug-00	17	80,000	1
2000 Boundary Verif - Places, MCDs, Am Indians	May-00	Aug-00	17	100,000	1
STF Reference Maps					

All Regional Offices					
Map Type	Start	End	Weeks	Sheets/Set	Sets
1990 Census County Block Maps	Mar-01	May-01	13	80,000	0
Census Tract Boundary Maps (See PL)	Mar-01	May-01	13	6,500	0
Urbanized Area Boundary Maps	Jun-01	Aug-01	13	500	0
Governmental Unit Block Maps	Mar-01	May-01	13	80,000	0
Non-Decennial Maps					
Current Survey Maps (10K/mo)	Apr-95	Dec-02	400	1,000,000	1
Continuous Measurement (10K/mo)	Apr-95	Dec-02	400	1,000,000	1
1997 Agriculture Census	Feb-98	Feb-98	4	5,000	1
Special Census	Jan-95	Dec-98	208	30,000	2
School District/Poverty Program					
1996 School District Delineation	Jun-95	Jan-96	35	20,000	2
1996 School District Verification	Jun-96	Nov-96	26	20,000	1
1998 School District Delineation	Jun-97	Jan-98	35	20,000	2
1998 School District Verification	Jun-98	Nov-98	26	20,000	1
2000 School District Delineation	Jan-99	Jan-00	35	20,000	2
2000 School District Verification	Jun-00	Nov-00	26	20,000	1

WORKSTATION DIGITIZATION AND UPDATES					
	START	END	WEEKS	UNITS	WORKLOAD
BBSP Updates	Sep-96	Jun-97	39	Mapsheet	42,000
BBSP Verification Updates	Mar-97	Jun-97	13	Mapsheet	16,000
VDT/Leg Dist Insertion	Mar-99	Aug-99	22	VTDs	185,000

WORKSTATION DIGITIZATION AND UPDATES					
	START	END	WEEKS	UNITS	WORKLOAD
VDT/Leg Dist Verification Updates	Aug-99	Oct-99	9	VTDs	47,000
106th CD Boundary Insertion	Aug-98	Oct-98	9	Mapsheet	1,200
107th CD Boundary Insertion	Aug-00	Oct-00	9	Mapsheet	1,200
108th CD Boundary Insertion	Aug-02	Oct-02	9	Mapsheet	2,400
Boundary and Annexation Survey					
1996 BAS Digitizing	May-96	Aug-96	17	Mapsheet	1,000
1997 BAS Digitizing	Jan-97	Aug-97	34	Mapsheet	20,000
1998 BAS Digitizing	Jan-98	Sep-98	39	Mapsheet	30,000
1999 BAS Digitizing	Jan-99	Sep-99	39	Mapsheet	25,000
2000 BAS Digitizing	Jan-00	Mar-00	13	Mapsheet	25,000
2001 BAS Digitizing	Jan-01	Sep-01	39	Mapsheet	15,000
American Indian Areas Insertion	Jan-97	Sep-99	143	Mapsheet	32,000
American Indian Areas - Verification updates	Oct-98	Mar-00	78	Mapsheet	300
MAF Operations					
MAF Office Resolution (MAFGOR/TIP/PALS)	Oct-97	Sep-98	52	Addresses	10,000,000
Special Place/GQ correction/insertion	Jan-00	May-00	21	Mapsheet	10,000
MAF Reconciliation	Jul-98	Sep-98	9	Mapsheet	250,000
ICM Corrections	May-00	Sep-00	18	Mapsheet	6,000
Advance List/Rural Directory Capture	Mar-98	Sep-98	30	Mapsheet	6,000

WORKSTATION DIGITIZATION AND UPDATES					
	START	END	WEEKS	UNITS	WORKLOAD
Census Map Preview Updates	Sep-96	Jun-98	91	Mapsheet	28,000
Targeted Canvassing Updates	Apr-99	Jun-99	13	Mapsheet	10,000
Continuing MAF Office Resolution (10K/mo)	Oct-98	Jun-03	243	clusters	607,500
Geographic Areas Programs					
Statistical Areas Insertion	Apr-97	Sep-99	126	Mapsheet	30,000
Statistical Areas - Verification Updates	Oct-98	Mar-00	74	Mapsheet	7,000
Crews-of-Vessels Insertion	May-00	Aug-00	13	Mapsheet	500
Military/Park Boundary Insertion/update	Dec-97	May-98	22	Mapsheet	860
Urbanized Area Delineation/Insertion	Oct-00	Jan-01	13	Mapsheet	1,000
Settlement Clusters Delineation/Insertion	Jan-00	May-00	17	Mapsheet	1,000
Traffic Analysis Zone Insertion	Mar-99	Aug-99	22	Mapsheet	38,000
Census Operations					
POW Geocoding	Jun-00	Feb-01	39	response	600,000
Block Split Updates	May-00	Jul-00	13	Blocks	100,000
Map Spot Digitizing	Mar-98	Sep-98	30	spots	7,000,000
Map Spot Digitizing - L/E	May-00	Jul-00	9	spots	500,000
List/Enumerate Digitizing Updates	May-00	Jul-00	9	Mapsheet	50,000

WORKSTATION DIGITIZATION AND UPDATES					
	START	END	WEEKS	UNITS	WORKLOAD
Test Census/Dress Rehearsal	Jun-96	Dec-99	183	Mapsheet	1,000
Interactive Editing - Publication Maps	May-01	Mar-02	43	Mapsheet	72,000
Local Government Info Products					
Census Address List Review	Jan-99	Aug-99	30	Mapsheet	120,000
Appeals Process Updates	Oct-99	Feb-00	18	Mapsheet	12,000
2000 Boundary Verification Updates	May-00	Aug-00	17	Mapsheet	5,000
Other Maps					
Current Survey Updates (0.2K/mo)	Apr-95	Dec-02	400	Mapsheet	20,000
National Content Survey 2K/mo)	Jun-96	Dec-02	339	Mapsheet	169,500
1997 EAC	Oct-98	Sep-99	48	Mapsheet	7,000
Other Special Census	Jan-95	Dec-98	208	Mapsheet	200
School District/Poverty Program					
1995/96 School District Boundary Insertion	Sep-96	May-97	35	Mapsheet	2,240
1997/98 School District Boundary Insertion	Jun-97	May-99	100	Mapsheet	1,700
1999/00 School District Boundary Insertion	Jul-00	Dec-00	22	Mapsheet	1,700

Acquisition Milestones	Start	Complete
Preparation/Review/Approval of Requirements Initiative	02/01/96	06/31/96

Preparation/Review/Approval of Agency Procurement Request	05/01/96	09/31/96
Preparation of Specifications and Test Procedures	03/01/96	09/31/96
Finalization of Specifications and Test Procedures	10/02/96	11/30/96
Issuance of Synopsis	12/01/96	12/31/96
Compilation of Solicitation Package	10/03/96	01/08/97
Legal Review of Solicitation Package	01/11/97	02/12/97
Issuance of Solicitation	02/15/97	03/15/97
Receipt of Proposals		03/16/97
Technical Evaluation/Negotiations	03/17/97	06/04/97
Operational Capability Demonstration	06/21/97	07/09/97
Best and Final Offers Evaluation	07/12/97	08/20/97
Contract Preparation and Review	08/23/97	10/01/97
Contract Award		10/04/97
Deliveries	11/02/97	11/05/99